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Competition of politicians for wages and office

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Abstract We examine a model in which two politicians compete for office and for wages. Their remunerations are either set by the public or are offered competitively by the candidates during campaigns. Our main finding shows that competitive wage offers by candidates lead to lower social welfare than remunerations predetermined by the public, since wage competition may lead to higher wage costs or to the election of less competent candidates.

1 Introduction

In this paper we examine how politicians' wages should be determined. If politicians in office provide public goods, remunerations should ensure that the most competent citizen runs for office and will be elected at minimum wage costs. The central institutional design issue of this paper is motivated as follows: There exist two institutional frameworks in which pay rates of politicians are determined. First, politicians face a given remuneration schedule when they run for office. For instance, individuals running for an office of the executive branch face wage rates determined by laws which, in turn, have been formulated in the parliament that represents the electorate.

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Second, politicians may have a major impact on their own remuneration. For instance, most parliaments design the laws that stipulate compensation for their members. How self-designed remuneration packages influence politicians' decisions on whether to run has been demonstrated in a wealth of research. For instance, Hall and Van Houwelling (1995) analyze the impact of a 1990 law that significantly increased pensions for US-congressmen who retired after 1992. They find that a significant number of congressmen who otherwise would have retired in 1990 decided to re-run for office in order to receive this financial windfall.[1]

In a stylized model, we compare both these institutional settings determining the remuneration of politicians. We consider a citizen-as-candidate model, where an elected politician undertakes policy projects for a society. Candidates may differ in competence, and wages for politicians are financed by taxes. Our main insights are as follows: First, as a rule, the competence of elected candidates is equal or higher when the public determines wages optimally as opposed to remuneration being self-designed by candidates. Second, in the case of competitive wage offers by candidates, social welfare is usually lower than in the case of predetermined remuneration. The intuition for this result is as follows: Since taxation is distortionary, higher wages impose economic costs on the electorate. On the other hand, higher wages may prompt the more competent politicians (as well as less competent ones) to run for office, which generates economic benefits as voters can elect the more competent candidate for office. The two wage schemes—publicly determined wages and competitive wages—solve this trade-off differently. Competition bids up wages beyond the level required for an efficient selection of politicians. The more competent candidate is the residual claimant as he can ask for wages that make voters indifferent between both candidates. The more competent candidate—who knows that he produces a larger surplus—proposes a wage that allows him to capture all the extra surplus he generates. If wages are set by the electorate, then the wage must be just high enough to induce the better candidate to run for office, thus ensuring that the extra surplus that candidate generates goes to the voters. In this case voters are the residual claimants. Since wages are financed by distortionary taxes, welfare is higher with predetermined wages.

The current analysis draws on four strands in the literature. First, there exist a number of recent papers that discuss how the value of office affects the quality of politicians and their incentives to pursue socially efficient policies. Besley (2003) examines how paying politicians can solve the agency problems of incumbents who are subject to a two-period term limit. Caselli and Morelli (2004) examine how the quality of elected politicians is affected by the value of office when candidates know in advance whether they can convince the electorate of their abilities. Messner and Polborn (2003) develop a new type of citizen-candidate model by assuming that the abilities of candidates are observable to voters, whereas their opportunity costs are private information. Poutvaara and Takalo (2003) develop a tractable citizen-candidate model that allows for unobserved ability differences, informative campaigning, and political parties. These recent advances in modeling representative democracies illustrate that increasing the value of office does not necessarily increase the average quality of candidates.

[1] Groseclose and Krehbiel (1994), Keane and Merlo (2002), and Besley (2004) also identify the importance of financial considerations for politicians when they run for office.

None of the preceding papers, however, focuses on the comparison between remuneration set by the public and self-designed wages as attempted in this paper.

Second, incentive elements in politics, other than elections, have been discussed, e.g., by Gersbach (2003), where the value of holding office in the second term is made dependent on the realization of macroeconomic variables. This increases the incentive for politicians to undertake socially desirable policies with long-term consequences in the first term. Politicians are allowed to offer their own long-term wage contracts during campaigns. In contrast, in this paper we consider the competition of politicians for wages and office in a single term in the context of a citizen-as-candidate set-up. While the above literature suggests that contract competition between politicians is welfare-improving, our current paper provides a counter-argument. We show that politicians should not be allowed to offer their own remuneration schemes for the next term.

Third, candidates holding office will provide a public good, so we may face the standard free-riding and underprovision problem when public goods are privately supplied by a set of actors. This problem is discussed, e.g., in Palfrey and Rosenthal (1984), Bergstrom et al. (1986), Güth and Hellwig (1986), and recently Hellwig (2001). In our model, the interaction of the entry decisions of two actors is the only factor determining the level of a public good. Hence, for this simple public-good problem the public can overcome the underprovision problem by setting wages or by allowing politicians to offer wage schemes.

Fourth, we use a simplified version of the citizen-as-candidate model, as developed by Osborne and Slivinski (1996) and Besley and Coate (1997). In such settings, citizens who consider running for office must take into account the private costs incurred by running for office, benefits from policies they would like to undertake, and benefits from policies other potential candidates are likely to implement.

This paper is organized as follows: In the next section we introduce the model. We then examine fixed wages set by the public. In Sect. 4 we identify equilibria in cases where politicians can propose their remuneration. Section 5 contains the welfare comparison. In Sect. 6 we discuss the importance of our assumptions and several extensions of our model. Section 7 concludes.

2 The model

2.1 The set-up

We consider a society with N voters who have to elect a politician undertaking policy projects for all members of the group. There are two potential candidates, $i = 1, 2$, for this job. The remaining $N - 2$ individuals cannot be candidates and only act as voters.[2] Candidates differ in their competence: with his policies candidate i ($i = 1, 2$) can generate a net benefit $b_i > 0$ for every member of the society. We label candidates in such a way that $b_1 > b_2$. The value of b_i can be associated with the competency of candidates.

[2] We assume that N is greater than 4, i.e., there are more voters not seeking office than there are candidates.

For each candidate i, there is an individual cost c_i incurred by serving in office. This cost includes effort and opportunity costs involved in serving in office and any gains from being in office. If the latter source of utility is more important, we have $c_i < 0$. c_i is assumed to be perfectly observable by the voters. The elected politician receives a wage that is financed by distortionary taxation, which is levied on all other members of the society.[3] Let $\lambda \geq 0$ denote the shadow cost of public funds. That is, taxation uses $(1 + \lambda)$ of tax payers' resources in order to levy 1 unit of resources for paying wages to candidates in office. The utility of candidate i if he is elected and earns the wage W is

$$b_i + W - c_i, \tag{1}$$

while the utility of any other member of the society is

$$b_i - \frac{W(1+\lambda)}{N-1}. \tag{2}$$

If no potential candidate is willing to run, then a default policy will be implemented yielding a benefit of $b_0 = 0$ for every voter. If only one candidate runs for office, then he will automatically assume power.

2.2 Assumptions and economic problem

We compare two institutional systems of determining wages for elected politicians: remunerations are either set by the public or are offered competitively by the candidates during campaigning. We make two types of assumptions.

The first assumption defines the economic problem. It is assumed that the competency of candidates, i.e., the values of b_i, are observable by the public but not verifiable in a court. Hence, the public cannot make individualized wage offers. The rationale for this assumption is discussed extensively in the incomplete-contract literature (see Hart 1995 or Watson 2007). For instance, abilities of candidates may become known to other agents, but it is impossible to prove in a court that one individual has greater competence than another for undertaking future tasks in a public office.

This assumption introduces the following trade-off: When candidates themselves offer wages, they can offer different remunerations reflecting their interests. However, candidates do not care about social welfare as such. The public, in contrast, is concerned about social welfare but cannot offer different wages to the candidates and thus cannot replicate the outcome itself under competitive wage offers. If the public were offering different wages, the candidate with a lower wage could go to court claiming that he has the same level of competency and would win because of the verification problem discussed above.[4]

[3] In principle, our model allows for negative wages when candidates are highly interested in power and bid for office. In such cases, shadow costs of public funds should be set at zero.

[4] Note that public law in modern democracies prohibits different wage settings for public office without verifiable evidence.

The second set of assumptions is made for tractability. In particular, we assume zero cost for running as candidate, status-quo utility of zero when no candidate is running for office, observable utility from holding office expressed by c_i, two candidates, and linear dead weight costs λ. In Sect. 6 on robustness, we discuss the importance of these assumptions for our results.

2.3 The institutions

Here we outline the timing for both scenarios. In the first scenario, we discuss how voters would determine the wages for politicians. The timing in the first scenario is as follows:

Stage 1: Voters decide on the level of the politician's wage denoted by W.
Stage 2: The candidates decide simultaneously whether to run for office or not.
Stage 3: The voters elect one of the two candidates.

It is obvious in this first scenario that, if both candidates run for office, it is always optimal for the voters to elect candidate 1, because $b_1 > b_2$ and the wages for both candidates are identical. Note that we assume complete information. That is, voters observe the parameters $\{b_1, b_2, c_1, c_2\}$ before they set their wages.

In the second scenario, candidates themselves can offer wages, denoted by W_1 and W_2, which become effective if a candidate runs and is elected. Therefore, in the second scenario, the first two stages are replaced by:

Stage 1′: Candidates offer W_1 and W_2.

Note that it is always possible for a candidate to propose a salary so large that he will never get elected. Therefore, we do not explicitly model a stage where candidates decide whether to run or not in the second scenario. Throughout the paper, we use the weak dominance concept in the following way: In every possible voting game in the first or second scenario, voters are assumed to employ only strategies that are weakly undominated in that subgame. This refinement produces unique voting outcomes for every subgame (if we include tie-breaking rules when voters are indifferent). Given the equilibrium voting behavior, we look at running equilibria (first scenario) or wage offer equilibria (second scenario) of candidates, where we again eliminate weakly dominated strategies if they exist.

3 Fixed wages

We first consider fixed wages and obtain our first result.

Proposition 1 *There exists an equilibrium for stages* 2 *and* 3 *that depends on the wage level in the following way:*

- *If* $W \geq c_2 - b_2$ *and*
$$W \geq \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big), \tag{3}$$
then both candidates run for office and candidate 1 *is elected.*

- *If* $W \geq c_2 - b_2$ *and*
$$W < \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big), \tag{4}$$
then candidate 2 *runs for office and is elected.*
- *If* $W < c_2 - b_2$ *and* $W \geq c_1 - b_1$*, then candidate* 2 *does not run for office. Candidate* 1 *runs for office and is elected.*
- *If* $W < c_2 - b_2$ *and* $W < c_1 - b_1$*, no candidate runs for office.*

The proof of Proposition 1 is given in the appendix. Proposition 1 indicates the considerations the public has to weigh up in determining optimal wages. A higher wage may prompt the more competent candidate to run for office. Higher wages, however, will also attract the bad candidate. Nevertheless, as the more competent candidate will be elected if he runs for office, the public can always ensure that the more competent candidate will take office by specifying an appropriate wage. As higher wages imply more deadweight costs, the public has to trade off competency of office holders against the deadweight costs of financing the remuneration of politicains. We will later determine the optimal wage levels the public should set for the political race.

4 Competition for wage contracts

In this section we explore what happens if candidates can offer to perform political duties for a certain wage. After the candidates have proposed their remuneration scheme, the voters elect the candidate whom they believe will create the highest utility for them. Thus, the timing is as follows:

Stage 1′: Each candidate proposes a remuneration scheme W_i.
Stage 2: The voters observe W_1 and W_2 and elect one of the two candidates.

We first observe that candidate 1 is elected if[5]

$$\begin{aligned} &b_1 - \frac{W_1}{N-1}(1+\lambda) \geq b_2 - \frac{W_2}{N-1}(1+\lambda), \\ &b_1 - \frac{W_1}{N-1}(1+\lambda) \geq 0. \end{aligned} \tag{5}$$

Note that the latter constraint guarantees that voters are better off with the first politicians than without any politicians and sticking to the status quo, which would produce zero utility. In Propositions 2 and 3, we will state suitable and mild conditions to ensure that this assumption is not binding. Next we look at the equilibrium in which candidate 1 is elected.

[5] For convenience, we use a tie-breaking rule in favor of candidate 1 if voters are indifferent between candidates. Otherwise we would need to work with ε considerations.

Proposition 2 *Suppose* $(1+\lambda)(c_1-c_2) \leq (N+\lambda)(b_1-b_2)$. *Then, in any equilibrium candidate* 1 *is elected and wage offers satisfy*

$$W_1 = (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2.$$

Wages are indeterminate. In particular, there exists an equilibrium in which candidate 1 *is elected with minimal wages* $W_1^{\min}$ *and* $W_2^{\min}$ *given by*

$$\begin{aligned} W_2^{\min} &= \frac{N-1}{N+\lambda}\, c_1 - (b_1 - b_2)\frac{N-1}{1+\lambda}, \\ W_1^{\min} &= \frac{N-1}{N+\lambda}\, c_1. \end{aligned}$$

There also exists an equilibrium in which candidate 1 *is elected with maximal wages* $W_1^{\max}$ *and* $W_2^{\max}$ *given by*[6]

$$\begin{aligned} W_2^{\max} &= \frac{N-1}{N+\lambda}\, c_2, \\ W_1^{\max} &= (b_1 - b_2)\,\frac{N-1}{1+\lambda} + \frac{N-1}{N+\lambda}\, c_2. \end{aligned}$$

The proof is given in the appendix. An important consequence of Proposition 2 is that wages are indeterminate, i.e., there are infinitely many combinations of pairs (W_1, W_2) that can constitute an equilibrium.

The reason for the multiplicity of equilibria can be summarized as follows: Within the range $[W_1^{\min}, W_1^{\max}]$, candidate 2 is either better off when candidate 1 is elected, or he has no chance of winning the election if he proposes a high wage of W_2. Which candidate is elected depends solely on the wage difference $W_1 - W_2$. Hence there is no anchor for wage W_2, which causes the indeterminacy.

Candidate 2 and all voters will strictly prefer the equilibrium associated with $[W_1^{\min}, W_2^{\min}]$ over all other equilibrium wage combinations. Candidate 1, however, benefits most if $[W_1^{\max}, W_2^{\max}]$ is realized. Hence simple refinement criteria, such as the Pareto principle, cannot reduce the multiplicity of equilibria. In the next step, we look at equilibria in which candidate 2 wins. Proposition 2 indicates that candidate 1 can ask for higher wages than candidate 2. The wage difference is naturally closely related to the additional benefits $b_1 - b_2$ that candidate 1 will generate for voters.

For $\lambda = 0$, the condition in Proposition 2 $(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$ requires that the differential benefits the highly competent politician generates for the society are larger than the difference of the costs of the politician to provide the public good. Although the condition $(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$ appears to be the

[6] The net utility from electing a candidate must be positive. Hence, $b_1 - \frac{W_1^{\max}}{N-1}(1+\lambda) \geq 0$, which is equivalent to the condition $b_2 - \frac{1+\lambda}{N+\lambda}c_2 \geq 0$. This is a mild condition which is assumed to hold.

more plausible one, we supplement our discussion by characterizing the equilibria in the opposite case.[7]

Proposition 3 *Suppose* $(1+\lambda)(c_1-c_2) > (N+\lambda)(b_1-b_2)$. *Then, in any equilibrium candidate* 2 *is elected and wage offers satisfy*

$$W_1 = (b_1 - b_2)\,\frac{N-1}{1+\lambda} + W_2$$

Wages are indeterminate. In particular, there exists an equilibrium in which candidate 2 *is elected with minimal wages* $W_2^{\min}$ *and* $W_1^{\min}$ *given by*

$$\begin{aligned} W_1^{\min} &= (b_1 - b_2)\,\frac{N-1}{1+\lambda} + \frac{N-1}{N+\lambda}\,c_2, \\ W_2^{\min} &= \frac{N-1}{N+\lambda}\,c_2. \end{aligned}$$

There also exists an equilibrium in which candidate 2 *is elected with maximal wages* $W_2^{\max}$ *and* $W_1^{\max}$ *given by*[8]

$$\begin{aligned} W_1^{\max} &= \frac{N-1}{N+\lambda}\,c_1, \\ W_2^{\max} &= \frac{N-1}{N+\lambda}\,c_1 - (b_1 - b_2)\,\frac{N-1}{1+\lambda}. \end{aligned}$$

The proof of Proposition 3 follows the lines of the proof of Proposition 2 and is therefore omitted. Again, there is a continuum of pairs (W_1, W_2) that can constitute an equilibrium.

5 Welfare comparisons

5.1 The general case

In this section we discuss welfare comparisons. We assume that the public determines the wage in the first scenario in order to maximize welfare in terms of the utilitarian welfare function. Two views on welfare are present in the literature. Either utilities of ordinary voters alone are counted, or utilities of all individuals, including the candidates. We choose the latter approach for two reasons. First, it is difficult to justify excluding individuals from welfare considerations (see, e.g., Besley and Coate 1997). Second, our results tend to be reinforced if we exclude candidates from welfare considerations, since wage competition yields higher remunerations than fixed wages when the same candidate is elected.

[7] In this case tie-breaks are resolved in favor of candidate 2 in order to simplify the exposition.

[8] For voters to be better off by electing candidate 2 than with the status quo, the condition $b_2 - \frac{W_2^{\max}}{N-1}(1+\lambda) > 0$ must hold, which in terms of exogenous parameters is $b_1 - \frac{1+\lambda}{N+\lambda}c_1 \geq 0$. This mild condition is assumed to hold.

While in principle the equilibria of Propositions 2 and 3 allow for negative wage proposals, we restrict our welfare analysis to the plausible case of non-negative wages.

Following the logic of Sect. 3 in the case of a fixed wage, candidate 2 will run for office for any wage $W \geq c_2 - b_2$, because $b_2 + W - c_2 \geq 0$. Candidate 1 will enter the political competition if

$$W \geq \tilde{W} := \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big).$$

If $\tilde{W} \leq 0$, then the welfare-maximizing wage under a fixed remuneration scheme W^{opt} is zero. Candidate 1 runs for office for any non-negative wage W and is elected with certainty. Therefore, the public sets $W^{\text{opt}} = 0$, because otherwise they would have to incur the wage costs. In this case, welfare, denoted by U^{fix}, is given by

$$U^{\text{fix}} = Nb_1 - c_1 - \lambda W^{\text{opt}} = Nb_1 - c_1.$$

If $\tilde{W} > 0$ and $\tilde{W} > c_2 - b_2$, there exist two potentially optimal wage offers. The first of these wage levels is $W^{\text{opt}} = c_2 - b_2$, in which case candidate 1 would not run for office and candidate 2 would be elected. In this case, overall welfare would be given by

$$U^{\text{fix}} = Nb_2 - c_2 - \lambda W^{\text{opt}} = Nb_2 - c_2 - \lambda(c_2 - b_2).$$

The second potentially optimal wage level is $W^{\text{opt}} = \tilde{W}$. In this case, candidate 1 would run for office and would be elected with certainty. Overall welfare would be given as

$$U^{\text{fix}} = Nb_1 - c_1 - \lambda\tilde{W}.$$

Therefore, for $\tilde{W} > 0$ and $\tilde{W} > c_2 - b_2$, $W^{\text{opt}} = \tilde{W}$ is the optimal remuneration for politicians, if $Nb_1 - c_1 - \lambda\tilde{W} \geq Nb_2 - c_2 - \lambda(c_2 - b_2)$.

If $\tilde{W} > 0$ and $\tilde{W} < c_2 - b_2$, then the welfare maximizing wage under a fixed remuneration scheme is $W^{\text{opt}} = \tilde{W}$. Candidate 1 runs for office for $\tilde{W}$ and is elected with certainty. In this case, overall welfare is given by

$$U^{\text{fix}} = Nb_1 - c_1 - \lambda\tilde{W}.$$

We turn next to compensation schemes offered competitively by the politicians. According to Sect. 4, for $(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$ candidate 1 offers the wage

$$W_1 = (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2$$

and is elected.

Overall welfare, denoted by U^{var}, is given in this case by

$$U^{\text{var}} = Nb_1 - c_1 - \lambda W_1.$$

Recall that the minimal and maximal wages are given by Proposition 2.

For $(1+\lambda)(c_1 - c_2) > (N+\lambda)(b_1 - b_2)$, candidate 2 is elected with a wage W_2 which must satisfy the equilibrium boundaries. Overall welfare is simply:

$$U^{\text{var}} = Nb_2 - c_2 - \lambda W_2,$$
$$W_2 = W_1 - (b_1 - b_2)\frac{N-1}{1+\lambda}.$$

Recall that the minimal and maximal wages in this case are given by Proposition 3.

The preceding observations lead to the following result:

Proposition 4

(i) *Suppose* $\lambda > 0$. *For sufficiently large* N, *welfare is always higher under fixed wages than under competitive wages. In both scenarios the more competent candidate is always elected.*

(ii) *Suppose* $\lambda = 0$. *For sufficiently large* N, *fixed and competitive wages yield the same welfare.*

The proof of Proposition 4 is given in the appendix. Proposition 4 indicates that fixed wages outperform self-designed remuneration packages as long as the size of the society is not too small.

The comparisons in the proof illustrate that, under competitive wage offers by candidates, realized wage costs become higher than they would under fixed and predetermined remunerations for politicians. The main intuition for the result is as follows: Both wage schemes provide a solution for the following trade-off: Higher wages prompt the more competent politician (as well as the less competent one) to run for office. This enables voters to elect a competent office-holder, which increases welfare. Higher wages imply higher tax distortions, which lowers welfare. Consider now the competitive wage regime. The more able candidate proposes a wage that allows him to capture all the extra surplus which he generates. This means that wages end up by being too high. Given the cost of raising public funds, the welfare-optimal wage must be just high enough to induce the better candidate to run for office so that the extra surplus generated by that candidate goes to the voters.

It is a little surprising that wage competition leads to excessive wages if we think of Bertrand competition. However, candidates compete with "differentiated products" and do not fully take into account the tax distortions they create for society.

5.2 A special case

There are two reasons why it is instructive to consider the case $c_2 = 0$. This case enables us to provide a simple illustration of the role of candidate competency and the impact of the shadow costs of funds on the relative welfare comparison between fixed and flexible wages.[9] As we do not make an assumption regarding N, we first state an analogous result to Proposition 4.

Proposition 5 *Suppose* $\lambda > 0$*, then*

(i) *welfare is always higher under fixed wages than under competitive wages;*
(ii) *candidate* 1 *is elected equally or more often under fixed wages than under competitive wages.*

The proof of Proposition 5 is given in the appendix.

Proposition 6 *For* $\lambda = 0$*, candidate* 1 *is elected under fixed wages and competitive wages equally often as candidate* 2*. Both scenarios yield the same welfare.*

The proof of Proposition 6 is given in the appendix. Propositions 5 and 6 provide further insight into the role of tax distortions. The more competent candidate can capture all the surplus under competitive wages, which creates tax distortions and lowers welfare compared to fixed wages. Such tax distortions may, however, help candidate 2 to get elected under competitive wages, while candidate 1 is elected under fixed wages. This further lowers welfare in a competitive wage setting. The higher competency with fixed wages can only occur if N is not large, as otherwise Proposition 4 applies. If there are no tax distortions ($\lambda = 0$), neither of the two potentially welfare-reducing effects are present, and, as shown in Proposition 6, both scenarios yield the same welfare.

6 Robustness and extensions

Our paper shows that wage-setting competition does not have welfare-enhancing effects, as is usually the case with Bertrand competition.

Of course, our model builds on several assumptions, the importance of which we will discuss in this section. First, we have restricted the number of candidates to two. In principle, wage competition might become fiercer the more potential candidates there are. However, as long as individual costs of serving in office vary much less than the net benefits that candidates can generate, wage competition will depend on the two best candidates, i.e., the two candidates for whom b_i is highest. As a consequence, our welfare results will still hold in such a setting.[10]

Second, suppose that citizens incur some small cost of acting as candidates in the electoral competition. Our equilibria need to be slightly altered as candidates will only run for office if they have a chance of being elected. While this has no effect in the case of publicly determined wages, the remuneration the more able candidate can obtain with competitive wages increases. This further lowers social welfare when wages are offered competitively. Hence, the welfare comparison remains qualitatively the same in this case.

Third, we could assume that the status quo is causing an infinitely negative utility. This would exclude the fourth case in Proposition 1 and would simplify its proof. The welfare results remain the same.

[9] The case $c_1 = 0$ yields qualitatively the same results, but it is more cumbersome to present.

[10] Details are available on request.

Fourth, we have assumed linear deadweight losses. This can be justified as a first-order approximation to tax distortions when a member of the society has to make a non-negligible contribution to paying elected public officials. However, since our main arguments in comparing fixed wages to competitive wages (notably in Sect. 5) only rely on the existence of positive deadweight costs, our results tend to be robust to non-linear deadweight costs.

Fifth, imagine a world where there are only imperfect signals about the competence of candidates, and these signals are observed only after a candidate has decided to run for office. In this context, pooling equilibria under fixed wages might occur where some low-competence and low-opportunity-cost candidates mimic the other types, thus possibly causing a bad-selection problem as identified by Caselli and Morelli (2004) and Poutvaara and Takalo (2003). But politicians can also destroy pooling equilibria by burning money (through not directly-informative advertising, see Gersbach (2004). Whether our conclusions hold when there is asymmetric information regarding the competency of candidates, and politicians run costly campaigns is left for future research.

Sixth, an interesting variant of our model[11] is to assume, as before, that there are two candidates with allocations (b_1, c_1) and (b_2, c_2), where c_i is an increasing function of b_i. Candidate 1 may mimic the somewhat less competent candidate, i.e., he can undertake b_1 at cost c_1 or b_2 at cost c_2. If $b_1 - c_1 > b_2 - c_2$, our result can be applied in this framework, as candidate 1 has no incentive to imitate candidate 2. If the cost function is strictly concave, i.e., $b_1 - c_1 < b_2 - c_2$, such a framework creates two kinds of economic problems.

(i) Even if the public has complete information, candidate 1 may simply implement b_2. This commitment problem will seriously inhibit the functioning of both wage-setting schemes as candidate 1 will never implement b_1. As both candidates will effectively play type 2, it is straightforward to show that both wage schemes will lead to the same wage and the same welfare.
(ii) Suppose there is incomplete information for the public regarding the type of politican and also suppose $b_1 - c_1 < b_2 - c_2$, such that candidate 1 has an interest in claiming that he is type 2 if he gets elected. Then we will have pooling equilibria under competitive wages where both candidates will offer wages according to type 2 as candidate 1 cannot credibly signal his type. Again, both wage schemes will yield identical results.

The situation will be different if there is punishment (e.g., reciprocal behavior of voters, career concerns, reputation losses) when a candidate announces a wage, claims to be of type 1, and imitates type 2 when elected. How such punishment schemes can be integrated into our model and how it will affect the balance between publicly determined wages and competitive wage offers will be an important avenue for future research.

[11] I am grateful to a reviewer for this suggestion.

7 Conclusion

Our results can be interpreted in several ways. The drawback of competitively offered wages can be understood as an argument against the general application of the dual mechanism—incentive contracts and elections—in politics as advocated by Gersbach (2003).

In a broader perspective, allowing politicians to compete with self-designed compensation packages might involve further adverse consequences. Wealthy candidates running for office may be able to forgo remuneration from the public completely. Accordingly, other, less wealthy candidates may not be able to compete on equal terms in political campaigns. As we intend to examine in subsequent research, this might undermine a core principle of democracies which says that the pool of candidates for political positions should not be constrained a priori. Hence allowing for competitively offered wages in each term does not appear to be a priority in broadening the scope of democracies.

Appendix

Proof of Proposition 1 Note that if candidate 1 decides to run for office, he will be elected independently of whether candidate 2 decides to run for office or not. Therefore, candidate 2 should run for office if and only if his utility from serving as a politician is greater than zero, which is his utility from the default outcome when no candidate runs for office. Thus "run for office" is weakly dominant for candidate 2 if $b_2 + W - c_2 \geq 0$. If $b_2 + W - c_2 < 0$, "do not run" is weakly dominant. Hence, if $W \geq c_2 - b_2$, candidate 2 will run for office. If $W \geq c_2 - b_2$, then candidate 1 will run for office if

$$b_1 + W - c_1 \geq b_2 - \frac{W}{N-1}(1+\lambda)$$

i.e., if his utility from holding office is higher than the utility obtained when candidate 2 is in office. The condition can be transformed into

$$W \geq \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big).$$

If $W < c_2 - b_2$, candidate 1 will run for office if $b_1 + W - c_1 \geq 0$ and thus if $W \geq c_1 - b_1$. □

Proof of Proposition 2 First note that in order for candidate 1 to be elected, W_1 must satisfy

$$W_1 \leq (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2$$

because otherwise the public is better off electing candidate 2. This follows from Eq. (5). Therefore, when candidate 1 wants to be elected, he offers the wage

$$W_1 = (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2. \tag{6}$$

A downward deviation can be excluded, because then candidate 1 could raise his utility by offering a higher wage and would still be elected. Deviation to a higher wage leads to the election of candidate 2.

Candidate 1 will not deviate to a higher wage than in (6) and will not leave the office to candidate 2 if

$$b_1 + W_1 - c_1 \geq b_2 - \frac{W_2}{N-1}(1+\lambda).$$

Inserting the equilibrium value of W_1 as a function of W_2 from Eq. (6), this condition becomes

$$b_1 + (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2 - c_1 \geq b_2 - \frac{W_2}{N-1}(1+\lambda),$$

which can be transformed into

$$(b_1 - b_2)\left(1 + \frac{N-1}{1+\lambda}\right) + W_2\left(1 + \frac{1+\lambda}{N-1}\right) \geq c_1,$$

which yields

$$W_2 \geq \frac{N-1}{N+\lambda}c_1 - (b_1 - b_2)\frac{N-1}{1+\lambda} \tag{7}$$

Thus, candidate 1 will want to run for office if condition (7) is fulfilled and accordingly the proposed remuneration W_2 exceeds a certain threshold.

We next examine the optimal choice of W_2 by candidate 2. A possible deviation from the proposed equilibrium in the proposition for candidate 2 would be to offer a wage $W_2' = W_2 - \epsilon$ ($\epsilon > 0$ small) that would lead to his election. Candidate 2 will not choose this option if

$$b_1 - \frac{W_1}{N-1}(1+\lambda) \geq b_2 + W_2' - c_2,$$

i.e., if his utility from being a citizen under candidate 1 is higher than his utility from holding office himself. By inserting the equilibrium value of W_1, as given by (6), we obtain the condition

$$b_1 - \frac{W_2}{N-1}(1+\lambda) - (b_1 - b_2) \geq b_2 + W_2 - \epsilon - c_2,$$

which can be transformed into

$$W_2 \leq \frac{N-1}{N+\lambda}(c_2+\epsilon). \tag{8}$$

Therefore, if wage W_2 is small enough, candidate 2 would prefer to be a citizen under candidate 1 rather than running for office for a lower wage.

Therefore, there only exist values for wage offers W_2 that satisfy both conditions (8) and (7) if

$$\frac{N-1}{N+\lambda}c_2 \geq \frac{N-1}{N+\lambda}c_1 - (b_1-b_2)\frac{N-1}{1+\lambda}$$

and hence we obtain the assumption of the proposition given by

$$(1+\lambda)(c_1-c_2) \leq (N+\lambda)(b_1-b_2)$$

□

Proof of Proposition 4 We first prove statement (i). In principle, six different cases can occur.

Case 1: $\tilde{W} \leq 0$, $(1+\lambda)(c_1-c_2) \leq (N+\lambda)(b_1-b_2)$
Case 2: $\tilde{W} \leq 0$, $(1+\lambda)(c_1-c_2) > (N+\lambda)(b_1-b_2)$
Case 3: $\tilde{W} > 0$, $\tilde{W} > c_2-b_2$ and $(1+\lambda)(c_1-c_2) \leq (N+\lambda)(b_1-b_2)$
Case 4: $\tilde{W} > 0$, $\tilde{W} < c_2-b_2$ and $(1+\lambda)(c_1-c_2) \leq (N+\lambda)(b_1-b_2)$
Case 5: $\tilde{W} > 0$, $\tilde{W} > c_2-b_2$ and $(1+\lambda)(c_1-c_2) > (N+\lambda)(b_1-b_2)$
Case 6: $\tilde{W} > 0$, $\tilde{W} < c_2-b_2$ and $(1+\lambda)(c_1-c_2) > (N+\lambda)(b_1-b_2)$

If N is sufficiently large, we obtain $(1+\lambda)(c_1-c_2) < (N+\lambda)(b_1-b_2)$.

This implies that we can drop the cases 2, 5, and 6. Now we examine the remaining cases.

Case 1: As candidate 1 is elected under competitive wages, welfare is given by

$$U^{\text{var}} = Nb_1 - c_1 - \lambda W_1.$$

Under a fixed wage, the wage is set at zero, candidate 1 runs for office and is elected. We obtain

$$U^{\text{fix}} = Nb_1 - c_1.$$

Thus welfare under the fixed wage scenario is equal or greater than under competitive wages. Note that in both scenarios candidate 1 is elected.

Case 3: To derive our results in case 3, we proceed in four steps.

Step 1: Again, candidate 1 is elected under competitive wages. Due to Proposition 2 and the assumption of non-negative wages we obtain

$$W_2^{\min} = \max\left\{0, \frac{N-1}{N+\lambda}c_1 - (b_1-b_2)\frac{N-1}{1+\lambda}\right\}.$$

This yields

$$W_1^{\min} = \max\left\{\frac{N-1}{1+\lambda}(b_1 - b_2), \frac{N-1}{N+\lambda}c_1\right\}.$$

For sufficiently large N we obtain

$$W_1^{\min} = \frac{N-1}{1+\lambda}(b_1 - b_2).$$

Therefore, maximal welfare under competition for wages is given by

$$U_{\max}^{\mathrm{var}} = Nb_1 - c_1 - \lambda\frac{N-1}{1+\lambda}(b_1 - b_2).$$

Step 2: Under a fixed wage, welfare depends on which candidate is elected. Given the assumptions of case 3 and the non-negativity of wages, we have

$$U^{\mathrm{fix}} = \max\left\{Nb_2 - c_2 - \lambda \max\{0, c_2 - b_2\}, Nb_1 - c_1 - \lambda\tilde{W}\right\}.$$

We now show that for sufficiently large N the public will always set the wage at $\tilde{W}$ and therefore candidate 1 runs for office and is elected. As

$$Nb_2 - c_2 - \lambda \max\{0, c_2 - b_2\} \leq Nb_2 - c_2,$$

it suffices to show that

$$Nb_2 - c_2 < Nb_1 - c_1 - \lambda\tilde{W}.$$

Step 3: To prove the assertion, we insert $\tilde{W}$ and obtain

$$Nb_2 - c_2 < Nb_1 - c_1 - \lambda\frac{N-1}{N+\lambda}(c_1 - (b_1 - b_2)).$$

This inequality can be transformed into

$$c_1\left(1 + \lambda\frac{N-1}{N+\lambda}\right) - c_2 < \left(N + \lambda\frac{N-1}{N+\lambda}\right)(b_1 - b_2),$$

which holds for sufficiently large N (note that $\frac{N-1}{N+\lambda} \to 1$ for $N \to \infty$).

Step 4: We can state now that welfare under fixed wages is given by

$$U^{\text{fix}} = Nb_1 - c_1 - \lambda \tilde{W}.$$

Welfare is higher under a fixed wage scenario if

$$Nb_1 - c_1 - \lambda \tilde{W} > Nb_1 - c_1 - \lambda \frac{N-1}{1+\lambda}(b_1 - b_2).$$

Inserting $\tilde{W}$ yields

$$(1+\lambda)(c_1 - (b_1 - b_2)) < (N+\lambda)(b_1 - b_2).$$

This inequality holds for sufficiently large N. Again, candidate 1 is elected in both scenarios.

Case 4: Case 4 is analogue to case 3.
Under competitive wages, candidate 1 is elected and the maximal welfare is given by

$$U^{\text{var}}_{\max} = Nb_1 - c_1 - \lambda \frac{N-1}{1+\lambda}(b_1 - b_2)$$

according to the same considerations as in case 3.
Under fixed wages, welfare is given by

$$U^{\text{fix}} = Nb_1 - c_1 - \lambda \tilde{W}.$$

As in case 3, welfare is higher under a fixed wage if N is sufficiently large, and candidate 1 is elected in both scenarios.

Statement (ii) of the proposition follows immediately from the above considerations. If we insert $\lambda = 0$, welfare is given under both wage-setting regimes by $Nb_1 - c_1$, as candidate 1 is always elected. □

Proof of Proposition 5 We now examine the different cases.

Case 1: Suppose $\tilde{W} \leq 0$. This implies $c_1 < b_1 - b_2$, which can be easily verified by checking the definition of $\tilde{W}$. Then $(1+\lambda)c_1 \leq (N+\lambda)(b_1 - b_2)$ holds. Therefore, candidate 1 is elected under competition for wages with $W_2 = 0$, since $W_2^{\max} = 0$. Accordingly, W_1 is given by $\frac{N-1}{1+\lambda}(b_1 - b_2)$. Welfare is given by

$$U^{\text{var}} = Nb_1 - c_1 - \lambda \frac{N-1}{1+\lambda}(b_1 - b_2).$$

Since $\tilde{W} < 0$, the wage is set at zero with a fixed wage, and candidate 1 runs for office and is elected. We obtain

$$U^{\text{fix}} = Nb_1 - c_1.$$

Thus welfare is higher under the fixed wage scenario. In both scenarios candidate 1 is elected.

Case 2: Suppose $\tilde{W} > 0$ and $(1+\lambda)\, c_1 \leq (N+\lambda)(b_1 - b_2)$. Then candidate 1 is elected under competition for wages. Since $W_2^{\max} = 0$, welfare in this case is given by

$$U^{\text{var}} = Nb_1 - c_1 - \lambda \frac{N-1}{1+\lambda}\,(b_1 - b_2). \tag{9}$$

Under a fixed wage, the public sets the wage at $\tilde{W}$ so that candidate 1 runs for office and is elected if $Nb_1 - c_1 - \lambda \tilde{W} \geq Nb_2$.
For

$$\tilde{W} := \frac{N-1}{N+\lambda}\,\big(c_1 - (b_1 - b_2)\big),$$

this inequality can be transformed into

$$Nb_1 - c_1 - \lambda \frac{N-1}{N+\lambda}\,\big(c_1 - (b_1 - b_2)\big) \geq Nb_2.$$

This implies

$$(b_1 - b_2) \geq c_1 \frac{1+\lambda}{N + \lambda\left(2 - \frac{1}{N}\right)},$$

which always holds for $(1+\lambda)\, c_1 \leq (N+\lambda)(b_1 - b_2)$ because

$$(b_1 - b_2) \geq c_1 \frac{1+\lambda}{N+\lambda} \geq c_1 \frac{1+\lambda}{N + \lambda\left(2 - \frac{1}{N}\right)}.$$

This implies that under a fixed wage scenario, candidate 1 will run and be elected with certainty. We have welfare as

$$U^{\text{fix}} = Nb_1 - c_1 - \lambda \tilde{W}. \tag{10}$$

Comparing (9) and (10), welfare is higher under a fixed wage scenario if

$$\tilde{W} < \frac{N-1}{1+\lambda}\,(b_1 - b_2).$$

We insert $\tilde{W}$ and rearrange the terms. We obtain

$$(1+\lambda)(c_1 - (b_1 - b_2)) < (N+\lambda)(b_1 - b_2).$$

According to the assumptions in case 2, this inequality holds. Again, in both scenarios candidate 1 is elected.

Case 3: Suppose $\tilde{W} > 0$ and $(1+\lambda)\,c_1 > (N+\lambda)(b_1 - b_2)$. In this case, candidate 2 is elected under competitive wages. The welfare under competition for wages is given by

$$U^{\text{var}} = Nb_2 - \lambda W_2.$$

Under the fixed wage framework, welfare is

$$U^{\text{fix}} = \max\left\{Nb_1 - c_1 - \lambda\tilde{W},\, Nb_2\right\}.$$

Hence welfare with wages set by the public is higher than, or equal to, what it is under competitive wages.

While it is unambiguously clear that welfare is higher under fixed wages, it is not clear which wage the public will set in this scenario. The wage is set at $\tilde{W}$ such that candidate 1 runs for office and is elected if and only if

$$Nb_1 - c_1 - \lambda\tilde{W} \geq Nb_2,$$

which can be transformed into

$$(b_1 - b_2) \geq c_1 \frac{1+\lambda}{N + \lambda(2 - \frac{1}{N})}.$$

According to the assumption made in case 3, the upper inequality can either hold or not. This implies that candidate 1 may be elected under fixed wages, while under competition for wages, candidate 2 will be elected for sure.

All in all, welfare is always higher under fixed wages, while candidate 1 is elected equally or more often under fixed wages than under competitive wages. □

Proof of Proposition 6 *Case 1:* Suppose $\tilde{W} \leq 0$. This implies $c_1 < b_1 - b_2$. Hence $c_1 < N(b_1 - b_2)$ also holds. By Proposition 2 and using $\lambda = 0$ and $c_2 = 0$, we conclude that candidate 1 is elected under competition for wages. Welfare is given by

$$U^{\text{var}} = Nb_1 - c_1.$$

Under a fixed wage, the wage is set at zero, candidate 1 runs for office and is elected. We obtain

$$U^{\text{fix}} = Nb_1 - c_1.$$

In both scenarios, candidate 1 is elected, and welfare is given by $Nb_1 - c_1$ both under fixed wages and under competition for wages.

Case 2: Suppose $\tilde{W} > 0$ and $c_1 \leq N(b_1 - b_2)$. This implies that candidate 1 is elected under competition for wages. Welfare is given by

$$U^{\text{var}} = Nb_1 - c_1.$$

Under fixed wages, the public sets a wage no smaller than $\tilde{W}$ so that candidate 1 runs for office and is elected if and only if $Nb_1 - c_1 \geq Nb_2$. But this inequality holds by the assumption made in case 2. Therefore, welfare is given by

$$U^{\text{fix}} = Nb_1 - c_1.$$

As in case 1, candidate 1 is elected in both scenarios, and welfare is given by $Nb_1 - c_1$.

Case 3: Suppose $\tilde{W} > 0$ and $c_1 > N(b_1 - b_2)$. Under competition for wages, candidate 2 is elected and welfare is given by

$$U^{\text{var}} = Nb_2.$$

The public sets a wage strictly smaller than $\tilde{W}$ so that only candidate 2 will run for office and be elected if and only if $Nb_2 > Nb_1 - c_1$. But this inequality must hold in case 3. Therefore, welfare is given by

$$U^{\text{fix}} = Nb_2.$$

Hence fixed wages and competitive wages yield the same welfare, and in both scenarios, candidate 2 is elected.

□

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